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DOI: https://doi.org/10.1080/02640414.2016.1260807

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The influence of possession on the movement and physical demands in adolescent rugby union match-play

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Phases of Play in Rugby

- Ball out of Play (BOP)
- Attacking
- Defending
- Collisions (tackles, rucks, mauls, scrums)

Locomotion
The movement characteristics of English Premiership rugby union players
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Published online: 26 Sep 2012.

Cahill et al. JSS. 2013;31(3):229-237.

 movements

RESEARCH ARTICLE

Movement Demands of Elite U20 International Rugby Union Players
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- Rehabilitation
- Recovery
- Player development
- Physical preparation

Train for the average demands – unprepared for the most demanding passages of play – Tim Gabbett
Aim: To quantify the demands of attacking, defending and ball out of play.

Purpose: To establish the most demanding phase of play (attacking vs. defending) for forwards and backs.
Methods

• 1 Regional academy
• 12 matches (2014/2015 & 2015/2016 season)
• 59 male rugby union players [259 observations]
• Split into forwards ($n = 28$ [150]) and backs ($n = 31$ [109])
• Age: $17.6 \pm 0.6$ years
• Stature: $183.0 \pm 6.8$ cm
• Body mass: $89.4 \pm 10.9$ kg
Analysed video recordings for attacking, defending and ball out of play timings

Inertial sensors

**Gyrosopes:** Measure the orientation of the athlete's body position.

**Accelerometers:** Measure impact forces.

**Magnetometers:** Measure direction like a digital compass.

**Antenna:** Receives signals from GPS and GLONASS (Russian) space-based satellites for twice the tracking.

10 Hz global positioning system (GPS)
100 Hz accelerometer, gyroscope and magnetometer

(RD) Relative distance (m.min\(^{-1}\))
(PL) PlayerLoad\(^{\text{TM}}\) per minute (AU.min\(^{-1}\))
Statistical Analysis

• Linear mixed model
  - Random: ‘players code’ and ‘match code’
  - Fixed: ‘phases of play’ (attack, defence, ball out of play)
• SWC established for each variable (0.2 between-subject standard deviation) – (RD = 4.7%; PL = 4.9%)
• Magnitude based inferences calculated and assessed as:
  - 25-75% Possibly
  - 75-95% Likely
  - 95-99.5% Very Likely
  - >99.5% Almost Certainly
• ‘Unclear’ when crossing the upper and lower bound of the SWC
• Differences shown as percentage change ±90% confidence limits

Batterham & Hopkins *IUSPP*. 2006;11,51-57.
Hopkins et al. *MSSE*. 2009;41(1),3-12
## Results

<table>
<thead>
<tr>
<th>Time (mins)</th>
<th>Match Length</th>
<th>Ball in play</th>
<th>Ball out of play</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>74.8 ± 3.3</td>
<td>27.4 ± 2.9 (37%)</td>
<td>47.4 ± 4.1 (63%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time (mins)</th>
<th>Attacking</th>
<th>Defending</th>
<th>Ball out of play</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.7 ± 3.1 (17%)</td>
<td>14.7 ± 2.5 (20%)</td>
<td>47.4 ± 4.1</td>
</tr>
</tbody>
</table>

| Cycles (n)           | 27 ± 9        | 31 ± 10                     | 48 ± 3           |
| Average Cycle Time (s)| 26 ± 17       | 26 ± 18                     | 59 ± 33          |
| Minimum Cycle Time (s)| 7             | 7                           | 9                |
| Maximum Cycle Time (s)| 96            | 113                         | 259              |
Forwards vs. Backs (RD)

![Graph showing Relative Distance (m.min⁻¹) for Attack and Defence phases]

- **Unclear**
  - -0.1% [-5.6% to 5.3%]

- **Forwards likely** ↑
  - 7.6% [2.2% to 13.1%]

- **Backs**
  - Backs almost certainly ↑
  - -15.6% [-21.0% to -10.2%]

- **Forwards**
  - Forwards vs. Backs (RD)
Forwards vs. Backs (RD)

Backs almost certainly ↑
-15.6% [-21.0% to -10.2%]

Relative Distance (m.min⁻¹)

Ball out of play

- Forwards
- Backs

LEEDS BECKETT UNIVERSITY
Institute for Sport, Physical Activity & Leisure
Forwards vs. Backs (PL)

- Forwards almost certainly ↑
  18.7% [10.6% to 26.8%]
- Forwards almost certainly ↑
  29.1% [21.0% to 37.2%]
- Forwards possibly ↑
  6.5% [-1.6% to 14.6%]
Relative Distance

- Likely trivial: 1.5% [-3.0% to 6.1%]
- Attack Likely: 9.3% [4.1% to 14.4%]

Forwards and Backs comparison with dot plots for Attack and Defence.
PlayerLoad™

**Likely trivial**
-0.4% [-5.3% to 4.4%]

**Attack Likely**
10.0% [4.5% to 15.4%]
Key Findings

Movement demands in attack are unclear between forwards and backs

Movement demands in defence are harder for forwards than backs

Movement demands are higher in backs than forwards when the ball is out of play

PlayerLoad is higher in forwards than backs in all 3 phases of play (suggesting they are involved in more collisions / static exertions)

Attacking and defending are similar for forwards

Attacking is harder than defending for backs
HOW TO USE IT?
Worst case scenario protocol

PLAYER INVOLVEMENTS / DEVELOPMENT
12-15 mins of attacking or defending can be replicated in 30 mins of training

CONTEXT
70 m.min\(^{-1}\) to 117 m.min\(^{-1}\) = 2 m.s\(^{-1}\) / 7 km.h\(^{-1}\). Consider the decision making, change of direction, communication, technical rugby skill, scrums, etc

RUNNING GAME FOR BACKS?
Future studies should analyse match-play data using a similar method. Locomotor data split into velocity zones would enhance the understanding.
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